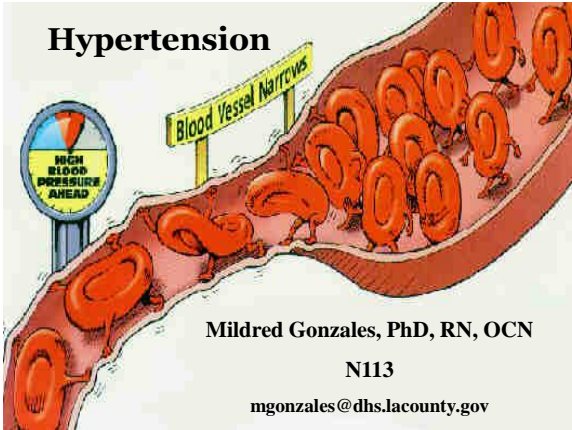


Hypertension



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Impact of HTN in Society

- Worldwide epidemic
- About 70 M American adults (29%) have HTN (1:3 ratio)
- 52% of people with HTN have their condition under control.
- Nearly 1 of 3 American adults has pre-HTN
- In 2013, >360,000 American deaths r/t HTN (i.e. ~ 1,000 deaths/day)
- HTN costs the nation \$46 B each year.
- Incidence ↑ in children due to obesity

(www.cdc.gov, 2015)

Impact of HTN, cont.

- The “Silent Killer”
 - HTN is usually not associated with symptoms, which would usually prompt individuals to seek medical help.
 - Unfortunately, severe target organ damage can occur.
- Major risk factor for heart attack, stroke, heart failure, and kidney failure.

Impact of HTN, cont.

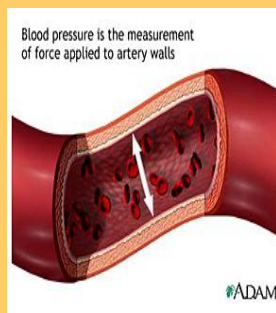
- African-Americans, Mexican-Americans, and Native Americans have higher incidence of HTN than Caucasians.
- Higher incidence in southeastern US – “Stroke Belt” regardless of ethnicity as compared with other areas in the country.

Impact of HTN, cont.

- Prevalence ↑ with age.
- Not considered a normal part of aging, but common among >60 year old adults.
- Older adults are more prone to drug overdosing/toxicity due to ↓ renal function.
- Isolated Systolic HTN are more common in older adults.

What is Hypertension?

- Sustained elevation of BP
- $\geq 140/90$ mm Hg
- Not a single reading
- Present on at least 2 occasions



Classification of HTN

- Essential or Primary
 - Elevated BP without identified cause and accounts for 90% to 95% of all cases of HTN
 - Contributing factors:
 - ↑SNS, overproduction of Na⁺-retaining hormones, Na⁺ intake, obesity, excessive alcohol intake, DM

Classification of HTN_{cont.}

- Secondary
 - Elevated BP with a specific cause that can often be identified and corrected
 - 5% to 10% in adults
 - >80% on children
 - Causes:
 - Coarctation/narrowing of the aorta, renal diseases, endocrine disorders, neurologic disorders, sleep apnea, medications, PIH, pheochromocytoma

Classification of BP

7th Report of the Joint National Committee (JNC7) on Prevention, Detection, Evaluation, & Treatment of High Blood Pressure (US DHS, 2007)

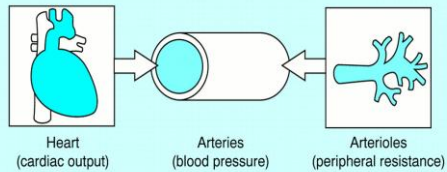
| Category | SBP mmHg | | DBP mmHg |
|-----------------------|----------|-----|----------|
| Normal | <120 | and | <80 |
| Prehypertension | 120-139 | or | 80-89 |
| Hypertension, Stage 1 | 140-159 | or | 90-99 |
| Hypertension, Stage 2 | ≥160 | or | ≥100 |

Pathophysiology of HTN

- Heredity
 - Strongly familial
 - Epidemiological studies
 - 30% genetic factor in various population
 - Familial shared lifestyle
 - dietary factor
 - activities



Cardiac Output and Systemic/Peripheral Vascular Resistance



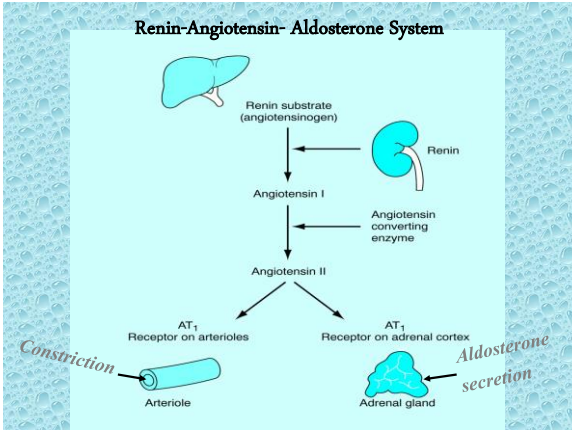
Pathophysiology of HTN, cont.

- Water and sodium retention
 - High sodium intake causes water retention
 - To some degree, Na^+ triggers the development of HTN
 - Recent research study - 2014

“An Unsavory Truth: Sugar, More than Salt, Predisposes to Hypertension and Chronic Disease”

by James J. DiNicolantonio, PharmD & James H. O’Keefe, MD





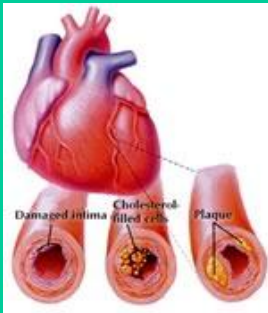
Pathophysiology of HTN, cont.

- Stress and increased sympathetic nervous system activity
 - ▢ Vasoconstriction
 - ▢ HR
 - ▢ renin release

Pathophysiology of HTN, cont.

- Insulin resistance and hyperinsulinemia
 - Present in primary HTN
 - High insulin stimulates SNS
 - Impairs nitric oxide-mediated vasodilatation

Pathophysiology of HTN, cont.



- Endothelial cell dysfunction
 - Endothelin produces prolonged vasoconstriction
 - Dysfunction causes ↓ vasodilator response to nitric oxide

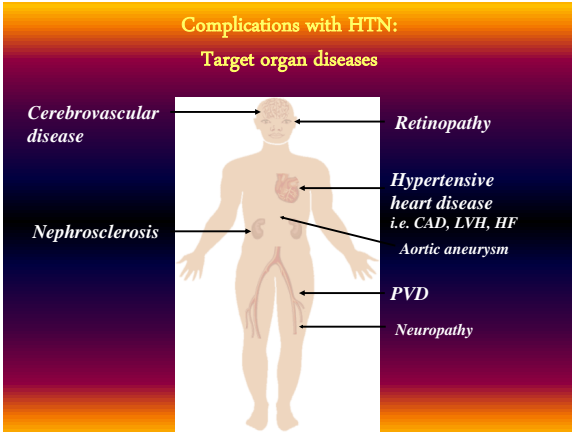
Risk Factors

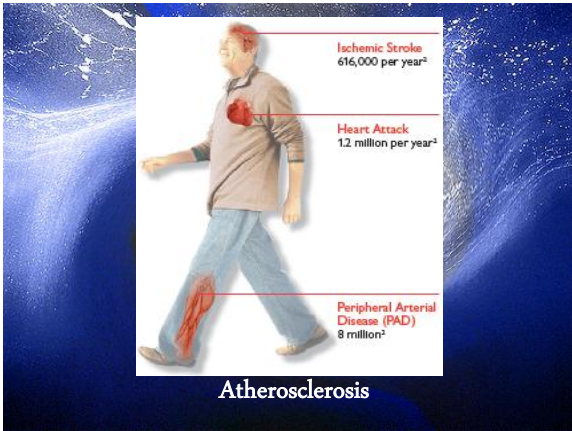
- Gender
 - Men – prevalent in young adulthood and early middle age
 - Women – prevalent after age 55
- Age
 - BP rises progressively with increasing age.

Risk Factors, cont.

- Race
 - African-Americans have the highest prevalence
- Lifestyle
 - Sedentary
- Family history
 - Genetics









Assessment

- Subjective
 - Past health history
 - Medications
 - Oral contraceptives may ↑BP
 - Functional health patterns
- Objective
 - Physical examination – neurological, CV, musculoskeletal, renal
 - Most people with HTN have no s/s
 - Accurate BP-taking

Assessment, cont.

- Diagnostic studies
 - Assess risk factors & comorbidities
 - Determine identifiable causes of HTN
 - Assess presence of target organ damage
 - Obtain lab tests:
 - CBC, UA, serum electrolytes (specifically K^+ , Ca^{++}), fasting blood glucose, BUN, Creat

Assessment, cont.

- ECG – may show evidence of ischemic heart disease and LVH
- Echocardiogram – may show evidence of structural heart disease and LVH

Common Nursing Diagnoses

- Ineffective health maintenance
- Anxiety
- Sexual dysfunction
- Ineffective therapeutic regimen management
- Disturbed body image

Collaborative Interventions

- Primary – to “retain” wellness
 - Risk factor stratification and treatment
 - Independent nursing intervention
 - Role of the nurse in screening and teaching

Collaborative Interventions, cont.

- Secondary Interventions – to “attain” wellness
 - Drug therapy
 - Monitor for effectiveness, contraindications, and side effects
 - Over 60 medications are available for treating HTN.
 - Currently, there are more medication options than there were years ago.

Selected Drug Classifications for HTN Treatment

Diuretics

- Drugs that promote the excretion of water and electrolytes by the kidneys.

Types:

- *Thiazide/thiazide-like diuretics*
 - e.g. hydrochlorothiazide/Hydrodiuril/HCTZ
 - Inhibit NaCl reabsorption in distal convoluted tubule
 - Inexpensive and work effectively.
 - Recommended for Stage 1 HTN.

Thiazide, cont.

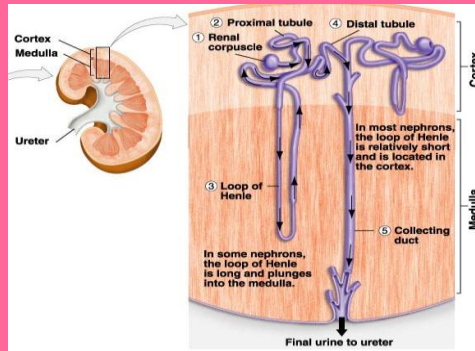
- Monitor K⁺ level; especially on elderly.
- If taking NSAIDs, they may reduce the effect of these diuretics.
- Avoid if allergic to sulfa drugs, since they are sulfonamide derivatives.



Thiazide and Related Diuretics

- Metolazone (quinazoline diuretic)
 - Inhibits sodium reabsorption in distal tubule
 - low doses metolazone significantly potentiates the diuretic effects of furosemide.
 - natriuretic and diuretic effects of combined treatment with furosemide and metolazone has been highly effective in reducing fluid retention
 - Recommended in cases of kidney failure & when other diuretics are not effective

Nephron



• Loop diuretics

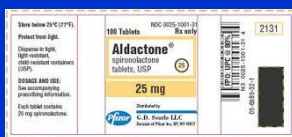
- e.g. furosemide/Lasix
- Work primarily on the ascending Loop of Henle to ↑ excretion of Na^+ , Cl^- , and H_2O
- Most potent diuretics
- Monitor electrolytes, especially if pt. is on digoxin.
- Hypokalemia can cause digitalis toxicity



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• Potassium-sparing diuretics

- e.g. spironolactone/Aldactone
- Act primarily in the collecting duct renal tubules to promote Na^+ & H_2O excretion and K^+ retention
- Caution with hyperkalemic pts.



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Selected Drug Classifications, *cont.*

Beta-blockers

- e.g. propranolol/Inderal, metoprolol/Lopressor, atenolol/Tenormin

The “lols”

- Block beta-adrenergic receptor sites in the heart.
- Thus, ↓ heart rate and contractility.
- Widely used for Stages 1 and 2 HTN.
- Contraindicated for pts with preexisting bradycardia, COPD or asthma (causes bronchospasm for “nonselective BB”).
- NSAIDs can ↓ effectiveness.

Beta blockers, *cont.*

Types:

1. Nonselective

- e.g. propranolol (Inderal)
- Inhibit β_1 (↓ HR, as a result BP decreases), & β_2 (bronchoconstriction) receptors

2. Cardio selective

- e.g. atenolol (Tenormin), metoprolol (Lopressor)
- Inhibit β_1 & not β_2 receptor
- No bronchoconstriction

Selected Drug Classifications, *cont.*

ACE inhibitors

- e.g. enalapril/Vasotec, captopril/Capoten
- #### The “prils”

- ↓ conversion of angiotensin I to angiotensin II; prevent A-II-mediated vasoconstriction
- Recommended for pts when diuretics and beta-blockers are contraindicated or ineffective.
- S/E of hyperkalemia; do not use with K^+ sparing diuretics
- Chronic cough and tickling in the throat are sometimes noted.

Angiotensin II Receptor Blockers (ARBs)

– e.g. losartan (Cozaar), valsartan (Diovan)

The “tans”

- ARBs block the chemical receptors for angiotensin II on the small arteries (arterioles).
- Therefore, the angiotensin cannot cause these arteries to constrict, which lowers the blood pressure.

Selected Drug Classifications, *cont.*

Calcium-channel blockers

– e.g. amlodipine/Norvasc, verapamil/Calan, nifedipine/Procardia

The “pines”

- Block movement of Ca^{++} into cells, causing vasodilation, \downarrow HR, contractility, and SVR.
- Recommended for pts who are unable to take diuretics and beta blockers, or when they are ineffective.

Selected Drug Classifications, *cont.*

Adrenergic inhibitors/Centrally acting agents

– e.g. clonidine/Catapres, Catapres TTS (7-day patch)

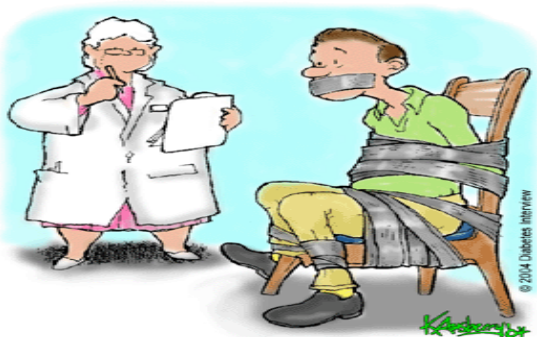
- Inhibit the SNS, thus causing dilation of the peripheral blood vessels
- Utilized if other drugs are ineffective in controlling HTN.
- S/E of fluid retention; may be given with diuretics
- Patch is given due to fewer side effects & better compliance.

Selected Drug Classifications, *cont.*

Direct Vasodilators

- e.g. sodium nitroprusside /Nipride, hydralazine/Apresoline
- Direct arterial vasodilation; reduces SVR and BP.
- IV use for HTN crisis
- S/E of acute hypotension (Nipride)
- Caution: nervous system stimulation may occur leading to tachycardia

JNC8 (Eight Joint National Committee) Hypertension Guideline Management Algorithm -see separate handout



By restricting both a patient's activity and caloric intake, the controversial "Duct Tape" therapy proved an effective alternative to traditional diabetes treatment.

© 2004 Diabetes Health

Hypertensive Crisis

- Severe and abrupt elevation in BP
- $\geq 180/120$ mm Hg
- Can trigger endothelial damage \rightarrow release of vasoconstricting substance \rightarrow can lead to life threatening damage to target organs
- Most common on “non compliant” patients and cocaine users

Hypertensive Crisis, cont.

- Manifestations depend on the target organ damage
 - Signs of neurologic dysfunction, retinal damage, heart failure, pulmonary edema, and renal failure
- MAP is the parameter used to monitor patient.
 $\text{MAP} = \text{DBP} + \frac{1}{3} \text{Pulse pressure}$
- Normal MAP: 70-100 mm Hg

Hypertensive Crisis, cont.

- Treatment (ICU setting)
 - \downarrow MAP 10% to 20% in first 2 hrs., then gradually over the next 24 hrs.
 - IV vasodilators - e.g., Nipride, NTG, Hyperstat, Apresoline, etc.
 - IV drug titration to prevent hypotension
 - Intra-arterial line or automated BP monitoring machine, ECG monitoring

Hypertensive Crisis, cont.

- Bed rest, hourly urine output monitoring, neuro checks
- Once the crisis is resolved, determine the cause.
- Requires appropriate management and extensive education to avoid future crises

Teaching Guidelines

- Disease process
 - Causative risk factors
 - Modifiable vs. Non-modifiable
 - Consequences of untreated HTN
 - Target organ damage
- Disease prevention
 - Work on modifiable risk factors

Teaching Guidelines, cont.

- Misconceptions
 - Patient feels “sick” when he is hypertensive.
 - Patient has a “hyper” personality.
 - Elevated DBP is more important than SBP.
 - HTN can be cured.
 - Patient cannot live a normal life.
 - High cholesterol means HTN.

“Just a Little Heart Attack”



Teaching Guidelines, cont.

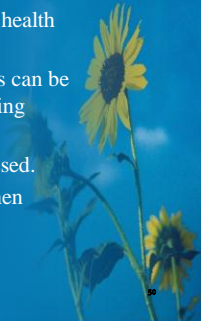
- Medications

- Plan regular and convenient times for taking meds
- Usually dosages are started low and adjusted as needed.
- Dosages for elderly are less than for younger adults
- Abrupt withdrawal of meds can cause severe HTN reaction.
- Side effects of meds are often temporary, e.g. hypotension, dizziness, drowsiness, N/V/D



Teaching Guidelines, cont.

- If sexual problems occur, inform health care provider.
- Emphasize that dosages and meds can be changed if not effective and causing adverse side effects.
- Do not double dose if dose is missed.
- Supplement diet with high K⁺ when taking K⁺- losing diuretics.



Teaching, cont.

- 3 hrs after taking meds, avoid hot baths, strenuous exercise and excessive amount of alcohol
- Explain how to minimize orthostatic hypotension
- Caution about high risk over-the-counter meds



Pharmacist: "and which medication reminder device would you like to use with this prescription?"

Teaching Guidelines, cont.

Home BP monitoring

- Ambulatory BP monitoring
 - Indicated for evaluation of “white coat HTN”
 - Absence of 10-20% BP decrease during sleep may indicate increased CVD risk.
- Patient self-check
 - Daily log
 - Provides information on response to therapy
 - Help improve adherence to therapy & useful for evaluating “white coat HTN”

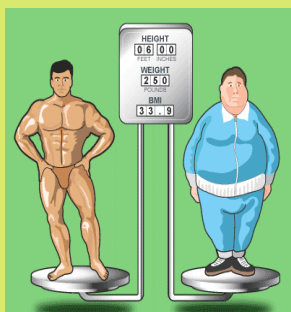


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Concepts on Lifestyle Modifications

- Encourage healthy lifestyles for all individuals
- Prescribe lifestyle modifications for all patients with prehypertension and hypertension.

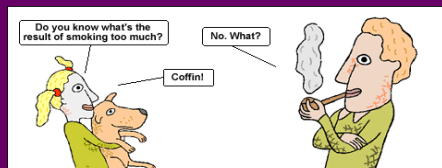
(US DHS, 2007)



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Lifestyle Management for HTN

- Weight loss
- Smoking cessation
- Modification of alcohol consumption
- Stress management



Lifestyle Management, cont.

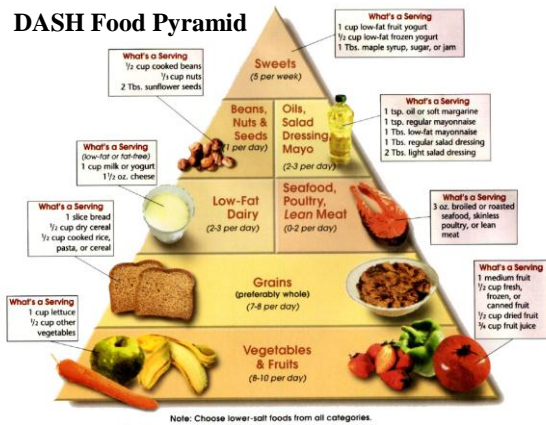
DASH - “*Dietary Approaches to Stop Hypertension*”

- Eating plan
 - Several servings of fish each week; plenty of fruits and vegetables; ↑whole grains; drink plenty of water
 - ↑K⁺, Mg⁺⁺, CHON, fibers
 - ↓saturated fats and cholesterol

DASH – Sodium Reduction

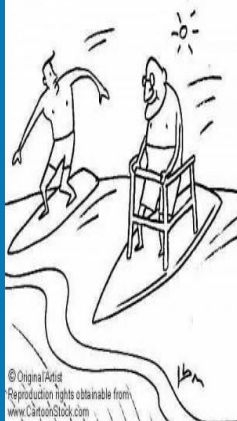
- < 2.4 g of sodium/day
- Avoid processed foods, i.e. canned and frozen dinners
- JNC8 recommends <1,500 mg/day

DASH Food Pyramid



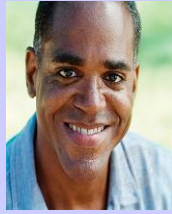
Lifestyle Management, cont.

- Increase physical activity
 - 3 to 4 sessions a week
 - Lasting on average 40 minute per session
 - Involving moderate to vigorous intensity physical activities



Case Study: Primary Hypertension

Roger is a 45-year old African American man with a diagnosis of hypertension . At the clinic, his BP was found to be 180/120 mm Hg.



Subjective data

- Father died of stroke at age 52
- Mother was alive but with HTN
- States that he feels fine and is not a “hyper” person

Subjective data, cont.

- Smokes one pack of cigarettes daily
- Drinks a six-pack of beer on Friday and Saturday nights
- States that his BP medication interferes with sexual relationships

Objective data

Physical examination

- Retinopathy
- Sustained apical pulse palpable in the 4th ICS just lateral to the midclavicular line

Diagnostic studies

- ECG: LVH
- UA: protein 31 mg/dl
- Serum creat: 1.6 mg/dl

Collaborative care

- Low sodium diet
- HCTZ 12.5 mg/day

Critical Thinking Questions

- What risk factors for HTN does Roger have?
- What evidence of target organ damage is present?
- What misconceptions about HTN should be corrected?

Critical Thinking, *cont.*

- Based on the assessment data presented, state one or more appropriate nursing diagnoses. What are the collaborative problems?
- What areas would you focus on in teaching this patient about his illness? Specify non-pharmacological strategies to lower his BP
